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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/668,910	09/23/2003	Christopher J. Corcoran	EMI.1003	2532

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EXAMINER

JONES, JUDSON

ART UNIT	PAPER NUMBER
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2834

DATE MAILED: 04/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/668,910

Applicant(s)

CORCORAN ET AL.

Examiner

Judson H. Jones

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-51 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 10-37 and 42-51 is/are rejected.
- 7) ☒ Claim(s) 7-9 and 38-41 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Language

In considering claim 38, the words “non-uniform spreaders” are interpreted to mean variations more significant than the typical minor variations due to wear from the dies used to cut the spreaders, slightly different thickness of stock material used in the manufacture or other unintentional causes.

In considering claim 30, the language “the first and second plurality of laminations comprise a plurality of identical laminations” is interpreted to mean that the first plurality of laminations may comprise one set of identical laminations and the second plurality of laminations may comprise another set of identical laminations.

Claim Objections

Claims 12, 20 and 25 objected to because of the following informalities: These claims say the shaft is one thing and then say the shaft is the opposite. According to applicant’s specification page 13, the device is a joystick (i.e., it has an input shaft) with force feedback (i.e., the input shaft is also an output shaft). The words “also” or “both” or “additionally” do not appear in the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2 and 4-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese reference 62221856 A. Japanese reference ‘856 discloses a motor with an

output shaft 10, a stator 8 with a curved surface having first and second coils 7c+, 4c+ positioned orthogonally, a rotor 3 with magnets 1 for movement in at least two degrees of freedom. (While Japanese reference '856 does not specify degrees of freedom, it does mention torque about the X, Y and Z axis. The rotation about the three axes are the three degrees of freedom.)

In regard to claim 2, Japanese reference '856 figure 2 shows wires in the Z direction (i.e., the longitudinal direction). The X axis and Y axis are both perpendicular to the Z axis.

In regard to claim 4 and 5, see Japanese reference '856 figure 1.

In regard to claim 6, see Japanese reference '856 fig 2.

A translation of Japanese reference '856 will be supplied in the next office action.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 10, 11, 14-16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference '856 in view of Lordo et al. 4,908,558 A. Japanese reference '856 discloses the motor but does not disclose a stator back iron. Lordo et al. teaches using a back iron in column 6 lines 43-46. Since Lordo et al. and Japanese reference '856 are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a back

iron in the Japanese reference '856 motor in order to reduce flux losses and thus improve the efficiency of the motor.

In regard to claim 10, Japanese reference '856 discloses the motor but does not disclose a gimbal mechanism. Lordo et al. teaches a gimbal mechanism in column 4 lines 7-27. Since Lordo et al. and Japanese reference '856 are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a gimbal support mechanism in order to increase the degrees of freedom for the device.

In regard to claim 11, see Lordo et al. figure 1.

In regard to claims 14, 16 and 18, see Lordo et al. figure 4.

In regard to claim 15, see the X, Y and Z axes in Japanese reference '856 figure 4.

Claims 12, 13, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference '856 in view of Marcus et al. 6,004,134 A.

Japanese reference '856 discloses the motor but does not disclose the output shaft also being used as an input shaft. Marcus et al. teaches making a joystick with force feedback in column 1 lines 5-8. Since Marcus et al. and Japanese reference '586 are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have made the shaft of a spherical motor to act as both an input and an output in order to increase the usefulness of the device by making it usable as a force feedback joystick.

In regard to claim 13, see Marcus et al. column 2 lines 62-64.

Claims 17, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference '856 as modified by Lordo et al. as applied to claims 14 and 18 above,

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and further in view of Fanning et al. 5,382,860 A. Japanese reference '856 as modified by Lordo et al. discloses the motor but does not disclose a wedge shaped lamination or spacers to space the laminations. Fanning et al. teaches that flat laminations used to make round stators have a problem due to the outside diameter of a stator being larger than the inside diameter. In figure 8 Fanning et al. teaches making a wedge shaped lamination. Since Fanning et al. and Japanese reference '856 as modified by Lordo et al. are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a wedge shaped lamination to prevent discontinuities in the flux path of the motor and thus to make the operation of the device more precise. See Fanning et al. column 5 lines 60-66.

In regard to claim 19, see Fanning et al. column 6 lines 35-45. Since Fanning et al. and Japanese reference '856 as modified by Lordo et al. are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized wedges in order to reduce eddy current losses in a motor.

Claims 22-24, 27 and 30-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference '856 in view of Lordo et al. and Trumper 5,196,745 A. Japanese reference '856 discloses a motor with an output shaft and a stator with an interior curved surface but does not disclose first and second stators. Lordo et al. teaches multiple stators in column 5 lines 17-22. Japanese reference '856 as modified by Lordo et al. discloses a motor with two stators but does not disclose first, second, third, fourth, fifth and sixth coils. Lordo et al. teaches a three phase power supply but only has first and second coils for each stator. Trumper teaches in column 6 lines 33-39 that adding more

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phases increases the precision of the device. In column 6 lines 15-18 Trumper teaches using at least a three phase power supply. Since Trumper and Japanese reference '856 as modified by Lordo et al. are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized first, second, third, fourth, fifth and sixth coils in a positioning device in order to increase the precision possible for the device.

In regard to claim 23, see Lordo et al. elements 22 in figure 1.

In regard to claim 24, see the X, Y and Z axes in Japanese reference '856 figure 4.

In regard to claims 27 and 30, see Lordo et al. figures 1 and 4.

In regard to claims 31 and 32, see Lordo et al. figures 2 and 4.

In regard to claim 33, see Lordo et al. column 2 lines 39-43 and see figure 3.

In regard to claim 34, see Lordo et al. column 2 lines 39-40 and see Trumper column 6 lines 15-18.

Claims 25, 26 and 46-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference '856 as modified by Lordo et al. and Trumper as applied to claim 22 and further in view of Marcus. Japanese reference '856 as modified by Lordo et al. and Trumper discloses the motor but does not disclose the output shaft also being used as an input shaft. Marcus et al. teaches making a joystick with force feedback in column 1 lines 5-8. Since Marcus et al. and Japanese reference '586 as modified by Lordo et al. and Trumper are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have made the shaft of a spherical motor to act as both an input and an output in order to increase the usefulness of the device by making it usable as a force feedback joystick.

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In regard to claim 26, see Marcus et al. column 2 lines 62-64.

In regard to claims 46-51, these claims recite the structural limitations of claim 25 and 33 while adding the word “providing.” The claim is a method of using the device of claims 25 and 33, and it is rejected over the same art references.

Claims 22-24 and 27-34 are alternatively rejected under 35 U.S.C. 102(b) as being anticipated by Miles 4,719,381 A. Miles discloses a motor having an output shaft 31, a first stator S1, a second stator S3, each having first, second and third coils as described in column 4 lines 36-45 and each having an interior curved surface, a commutation system for changing the distribution of the current in the coils as described in column 6 lines 16-25, a rotor R and at least one magnet on the rotor as described in column 4 lines 19-23, with the magnet being an electromagnet.

In regard to claims 23, see elements S1 and S3 in figure 1.

In regard to claim 24, stator S1 has vertical slots and stator S3 has horizontal slots for moving the shaft in first and second degrees of freedom.

In regard to claim 27, see Miles column 4 lines 55-58 and see figure 1.

In regard to claim 28, see Miles column 4 lines 36-40 and lines 46-49.

In regard to claim 29, the position shown in figure 2 is believed to be the neutral position of the shaft. In that figure the parallel slots are perpendicular to a longitudinal axis of the shaft.

In regard to claim 30, each plurality of laminations comprises a plurality of identical laminations.

In regard to claim 31, see Miles figure 2.

In regard to claim 32, see Miles figure 2 where the steps are viewed as being the portions left after the slots are cut into the laminations.

In regard to claim 33, see Miles column 4 lines 46-49.

In regard to claim 34, see Miles column 4 lines 2-6.

Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miles as applied to claim 22 and further in view of Marcus. Miles discloses the motor but does not disclose the output shaft also being used as an input shaft. Marcus et al. teaches making a joystick with force feedback in column 1 lines 5-8. Since Marcus et al. and Miles are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have made the shaft of a spherical motor to act as both an input and an output in order to increase the usefulness of the device by making it usable as a force feedback joystick.

Claims 35 and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Miles. Miles discloses laminations with an arcuate surface orthogonal to a first side surface and a plurality of slots as shown in figure 3 and as described in column 4 lines 55-58.

Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miles in view of Fanning et al. Miles discloses the lamination with the plurality of parallel slots but does not disclose a second side surface not parallel to the first side surface. Fanning et al. teaches that flat laminations used to make round stators have a problem due to the outside diameter of a stator being larger than the inside diameter. In figure 8 Fanning et al. teaches making a wedge shaped lamination where the sides of the lamination are not parallel. Since Fanning et al. and Miles are from the same field of endeavor it would have

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been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a wedge shaped lamination to prevent discontinuities in the flux path of the motor and thus to make the operation of the device more precise. See Fanning et al. column 5 lines 60-66.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lordo et al. in view of Japanese reference '856. Lordo et al. discloses the laminations with the plurality of slots as shown in figures 2 and 4 but does not disclose spreaders between the laminations. Japanese reference '856 discloses spreaders in figure 2. Since Japanese reference '856 and Lordo et al. are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized spreaders in the laminated stator piece in order to route the flux to where it needed to be and to thus improve the performance of the motor.

Allowable Subject Matter

Claims 7-9 and 38-41 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not disclose or teach magnets defining parallel sides of a parallelogram in a spherical motor in combination with the other features of claim 7. The prior art of record does not disclose or teach a ferromagnetic lamination for use in a stator having slots and a plurality of non-uniform spreaders as recited in claim 38.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Judson H. Jones whose telephone number is 571-272-2025. The examiner can normally be reached on 8-4:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



JHJ 4/16/2004



THANH LAM
PRIMARY EXAMINER